RESPONSE TO RFA # EPA-OAR-OAQPS-20-01

For:

ENVIRONMENTAL PROTECTION AGENCY (EPA)
2019 & 2020 Targeted Air Shed Grant Program

Project Title: **Battery Electric Delivery Trucks Project**

Applicant Name: South Coast Air Quality Management District
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Total Project Cost:

Project Title	EPA Funding Requested	Voluntary Cost Share	Total Project Cost	Project Period
Battery Electric Delivery Truck Project	$8,144,064	$6,418,738	$14,562,802	Oct 31, 2020 to Mar 31, 2024

Project Description: Deploy sixty (60) purpose built zero-emissions medium duty battery electric delivery trucks from Xos Trucks with up to five (5) different fleets in South Coast Air Basin (SCAB).

Project Location: The electric delivery trucks will be deployed with various short-haul vocation fleets located in Los Angeles, Orange, Riverside, and San Bernardino Counties in a wide variety of applications such as linen services, food delivery, cash transit hospitality and building restoration. The emission benefits from this projects will be realized in the ozone and PM2.5 nonattainment areas of Los Angeles in the SCAB.

PROJECT NARRATIVE

The South Coast Air Quality Management District (South Coast AQMD) is submitting "Battery Electric Delivery Trucks Project" application in response to the EPA "2019 & 2020 Targeted Air Shed Grant Program" (EPA OAR-OAQPS-20-01) Request for Applications (RFA) pertaining to the SCAB. The South Coast AQMD is the regional air quality agency responsible for Orange and the urban portions of Los Angeles, San Bernardino, and Riverside Counties. This area of 10,743 square miles is home to over 17 million people – about half the population of the state of California. It is the second most populated urban area in the United States and encompasses over 130 cities. The South Coast AQMD has regulatory responsibility for more than 100,000 businesses operating stationary sources, of which about 30,000 have air quality permits. Despite decades of aggressive efforts to reduce air pollution from stationary sources, the SCAB continues to have some of the worst air quality in the U.S. based on the number of days the National Ambient Air Quality Standards (NAAQS) for ozone are exceeded. Currently, the SCAB and Coachella Valley portion of the Salton Sea Air Basin (SSAB) have areas in non-attainment for ozone and particulate matter ($PM_{2.5}$). In addition, the 2019 & 2020 Targeted Air Shed Grant has ranked the urban portion of the SCAB (counties of Los Angeles, Orange, and San Bernardino) in the top five most polluted area relative to ozone and annual $PM_{2.5}$ standards. The most effective way to reduce air pollution impacts on the health of the SCAB's residents, including those in disproportionally impacted and environmental justice communities (EJCs) that are concentrated along the numerous transportation corridors and goods movement facilities, is to reduce emissions from mobile sources, both on-road and off-road, the principal contributor to the SCAB's air quality challenges. Consequently, the South Coast AQMD continues to work closely with the California Air Resources (CARB) and the U.S. EPA who have primary responsibility for these mobile sources.

Section 1 Project Summary and Approach

(1-A) Ongoing, Significant Reductions & Considerations of Other Activities: The 2016 South Coast AQMD's Air Quality Management Plan (AQMP or Plan) identified Class 4-8 heavy-duty trucks, including medium heavy-duty trucks, as a significant source of on-road mobile source NOx inventory. Short-haul vocational medium duty delivery trucks are one of many ways pursuant to a Zero Emission Technologies Roadmap, as well as to reduce community exposure to toxic diesel exhaust. In 2019 alone, the South Coast AQMD board approved serval medium duty truck projects totaling over $7.7 million. Although South Coast AQMD and its partners' have directed greater efforts to reduce emissions from medium duty sector, there are relatively fewer zero-emission medium duty trucks deployed due to high cost and lack of availability. South Coast AQMD is proposing to partner with Xos Trucks to deploy 60 medium duty battery electric delivery trucks in the SCAB. The new battery electric trucks are currently being tested with pilot customers. As result of the pilot demonstration, Loomis, an international cash handling company operating a fleet of 3,000 armored cash transit trucks in the U.S., and Bucket List Experiences (BLE), a hospitality operator in California and Hawaii, has committed to additional 49 battery electric trucks through this project.

The proposed battery electric Class 6 trucks (23,000 lbs. Gross Vehicle Weight) are powered by Xos Trucks' Power Systems with proprietary battery-electric energy storage and a drive unit manufactured by Dana. The vehicle comes equipped with state-of-the-art electric drivetrain technology that delivers up to 150 miles range on a single charge with modular in-house designed and manufactured battery packs up to 200 kWh. The Xos trucks have all necessary approvals for legal on-road operation including CARB/EPA and FMVSS/DOT certifications. The trucks warrantied for 3 years or 50,000 miles. South Coast AQMD selected Xos Trucks as its partner because of its: 1) proprietary battery technology tailored to the needs of commercial vehicle market; 2) purpose-built modular architecture and software systems designed from the ground-up to support the different end user applications; 3) horizontal strategy and lean manufacturing approach by integrating vetted, readily serviceable components from Tier-One suppliers and leveraging assembly capacity with established co-manufacturing partners to deploy reliable vehicles on the road quickly. Xos Trucks also shared positive feedback from its pilot customers Loomis and BLE, which reported that the battery electric trucks consistently has achieved vehicle driving efficiencies of 1.1-1.2 kWh per mile considering the harsh duty-cycle of in cash-in-transit operations, namely high idle time, large HVAC loads and the heavy armored body. The duty cycle of short-haul vocational market allows enough downtime to utilize the lower cost SAE J1772 Level II 19.2 kW chargers as the Electric Vehicle Supply Equipment (EVSE) for this project. Both the fleets and Xos Trucks will work closely together to ensure enough EVSE are installed prior truck deployment. The charge times are estimated to be 4-6 hours depending on actual daily usage.

Medium-duty vocational trucks are mostly used in urban centers and in densely populated areas for short-haul applications such as package delivery, food delivery, cash transit, as well as fleet services. The CARB 2016 State Implementation Plan (SIP) Emission Projection Data for trucks in the SCAB show medium-duty trucks makes up 19% of total on-road truck emissions. Although medium-duty truck emissions inventory is not as high as heavy-duty, operations within high population density areas suggest higher community exposure risk, especially toxic diesel exhaust emissions. Therefore, there is a critical need to transition the medium-duty sector to zero emission. The 2018 South Coast public fleet survey data show that over 99% of medium-duty trucks are currently powered by conventional engines, and although detailed private fleet data is not available at this time, South Coast AQMD staff estimates diesel trucks make up the majority of the fleets in this sector, with some gasoline powered trucks. With CARB's Truck and Bus Regulation

requiring older diesel truck to be turned over to either 2010+ diesel, alternative fuel, or zero emissions trucks by 2023, project like this one provides a unique opportunity for fleets to gain experience with zero emissions, as well as gain additional and necessary emissions reductions. However, based on information collected from South Coast AQMD's incentive programs, such as Proposition 1B, few zero emission trucks have been deployed to date. Without incentive programs to cover the incremental costs, most of the replacement trucks are likely to be diesel and some near-zero emission natural gas options, due to current cost and availability. South Coast AQMD needs deployment of a large scale of near-zero emission or zero-emission medium-duty vehicles into the SCAB to achieve significant progress toward the Basin's air quality goals. Zero emission technologies will help achieve immediate and on-going improvements in air quality and public health, particularly in areas disproportionately impacted by $PM_{2.5}$ pollution near densely populated urban areas in the SCAB.

The project team considered the full range of alternative fuel technologies, before deciding to pursue an EV truck deployment project, mainly due to electric drivetrain's superior emission reduction benefits. Electric drive is a 100% petroleum displacement strategy that dramatically reduces smog-forming, cancer-causing, and global warming emissions. Those living in low-income, minority or distressed areas are more likely to be paid on an hourly basis and cannot afford to take days off from work due to respiratory illness, asthma attacks, and other sicknesses. Further, they cannot compound this with added medical expenses. Reducing emissions will reduce incidences of respiratory illness, loss of workdays and by extension financial hardship. An electric truck has 100% fewer NOx and particulate matter emissions than a diesel truck, 100% fewer SOx emissions, and 100% less petroleum diesel consumption.

(1-B) Analysis of Emissions Inventory & Progress Towards Attainment: Detailed inventory analysis can be found in the emissions inventory attachment. The 60 battery electric trucks will displace over **120,800 gallons** of petroleum diesel fuel use per year. During its first year, the 60 trucks will together directly facilitate the reduction of **NOx and $PM_{2.5}$ emissions in the region by 1.89 tons, and 0.03 ton per year,** respectively based on estimates by EPA Diesel Emissions Quantifier. More importantly, the proven technical and economic success of these units will generate tremendous market interest which will quickly translate into thousands of tons of emission reductions throughout California. Some of the fleets have initially committed to older diesel truck replacements, which are subjected to the CARB's Truck and Bus Regulation with limited life for up to 2 years. Hence, the first-year reduction is greater than the average reduction over 10 years, see detailed emission reduction calculations attachment. The estimated **life time NOx, $PM_{2.5}$ and diesel fuel reductions are 16.79 tons, 0.32 ton and 1,208,000 gallons**, see Table 1 for detailed outline of emissions reductions.

(1-C) Description of Proposed Activity as Innovative and Well-Conceived Strategy: Medium-duty vocational trucks category is a significant source of NOx and $PM_{2.5}$ emissions causing adverse health effects that disproportionately impact residents who are more sensitive to air pollution (children and elderly) in the urban areas of SCAB. California has a unique opportunity to gain additional emissions reductions created by the latest CARB's Truck and Bus Regulation which require older fleet turnover by 2023. However, most of the replacements are likely to be diesel options due to high initial cost and availability of limited availability of near-zero and zero emission options. Therefore, this project is expected to provide a catalyst for fleets to consider zero emissions technologies. As such, South Coast AQMD has already placed significant importance on accelerating turnover rate of medium-duty trucks, including approving two near-zero and zero medium-duty projects totaling over $7.7 million in 2019 (Class 6 battery trucks and Ford 7.3 liter natural gas and propane near-zero engine development) with more medium duty development and incentive projects expected in 2020. Due to impact of COVID-19 in early 2020, fleets are facing operational uncertainties and unable to confirm the details of the replacement trucks. Therefore, majority of the emissions reduction calculation are based on the fleet expansion scenario.

South Coast AQMD assessed emission reduction potential of three available medium-duty vehicle strategies. The first strategy considers the baseline case of conventional MY 2010+ diesel as required by the CARB Truck and Bus Regulation. Although these engines are certified to 0.2 g/bhp-hr NOx standard, the in-use emissions are proven to be much higher due to low-load urban operation and low SCR efficiency, such as those found in typical short-haul urban delivery operations. Moreover, the missed opportunity on this round of fleet turnover means these diesel trucks will be in service for many more years before needing replacement. The second strategy involves replacement with low-emission natural gas trucks. Although this strategy will reduce NOx and $PM_{2.5}$ significantly its success is limited by higher initial cost and potential lack of infrastructure, since public natural gas refueling stations may not be readily available in all areas. Moreover, the uncertainty in future zero emissions regulation mandates further slows adoption of near-zero technologies as fleet owners seeks to make "one switch" to zero emissions. The final strategy is to replace diesel with battery electric trucks. This strategy will achieve most significant NOx and $PM_{2.5}$ emissions reductions in SCAB, and fits into South Coast AQMD's air quality goals and will help to increase market share of zero-emission electric trucks in the SCAB. Moreover, with the successful pilot demonstration like Loomis, battery electric trucks are proven to be well suited for short haul delivery applications. One strategy that's not mentioned here is the hydrogen fuel cell technology, since the technology is still in development and early demonstration stage and the cost and lack of infrastructure does not fit the needs of the short-haul medium-duty market at this time.

(1-D) Roles and Responsibilities of South Coast AQMD and Partners: The proposed project partners are South Coast AQMD, Xos Trucks, and Fleet Partners. The roles and responsibilities of the project partners are described below. **South Coast AQMD** is the

prime contractor to EPA with the responsibility to manage the entire proposed project, including scheduling, establishing contracts with technology development and demonstration partners, reviewing and approving invoices for completed tasks, preparing and submitting reports to EPA, and ensuring that project goals and deliverables are met. As follow-on to this project, South Coast AQMD will partner with U.S. EPA, CARB, CEC, and Ports of Los Angeles and Long Beach to incentivize replacement of older and dirtier diesel with electric delivery trucks via incentive funding such as the Hybrid and Zero Emission Truck and Bus Voucher Incentive Project (HVIP), Volkswagen (VW) Settlement, Proposition 1B and Carl Moyer Memorial Air Quality Standards Attainment Program (Carl Moyer). **Xos Trucks** is the truck manufacturer and data collection provider as well as the lead for the EVSE and supporting infrastructure aspect of this project. Specifically, Xos Trucks will assist each fleet partners to design and deploy their proposed electric truck, provide technical support and data logging to fleets for at least one year. **UniFirst Corporation, Choice Lunch, Loomis, Bucket List Experiences (BLE) and American Technologies, Inc. (ATI)** are the identified participating fleet partners and will be working with Xos Trucks for design and delivering the trucks, installing charging infrastructure as well as scrapping the replacement diesel trucks as applicable.

Section 2 Community Benefits, Engagement and Partnership

(2-A) Benefits to Impacted Communities: EJ communities (EJCs) have long been a focus of the South Coast AQMD. In 1990, the South Coast AQMD formed an Ethnic Community Advisory Group that was restructured as the Environmental Justice Advisory Group (EJAG). EJAG's mission is to advise and assist South Coast AQMD in protecting public health in South Coast AQMD's most impacted communities through the reduction and prevention of air pollution. The SCAB contains numerous communities experiencing disproportionate environmental impacts, including the Port communities that will directly benefit from the operation of proposed zero-emission technology. The purpose of South Coast AQMD's EJ program is to ensure that everyone has the right to equal protection from air pollution and fair access to the decision-making process that works to improve the quality of air within their communities.

EJCs are disproportionately impacted by diesel pollution, and the zero-emission delivery truck project provides immediate relief to many of these disadvantaged communities (DAC) located in the SCAB. The project includes facilities from the confirmed fleet partners that are domiciled or operated in EJCs. According to CalEPA's CalEnviroScreen 3.0 mapping tool, the location of the fleet bases in Santa Fe Springs, North Hollywood and Montebello are all located in EJCs that rank higher than 90th percentile in terms of pollution burden. This tool aggregates pollution and population data to score community burdens. Note that all the fleets operate in the surrounding regions which include many EJCs as shown in Figure 1 and the vehicles that travel from the site operate heavily in EJCs. EJCs near this project will benefit from the immediate reductions in diesel emissions, increased community engagement with local businesses and residents, and the long-term benefits of zero emission technologies. This year, the three AB 617 communities in the SCAB are beginning implementation of measures included in their CERPs using Community Air Protection (CAP) Funds. The goals of the AB 617 program are also consistent with South Coast AQMD's Environmental Justice Program to protect and improve public health through the reduction and prevention of air pollution.

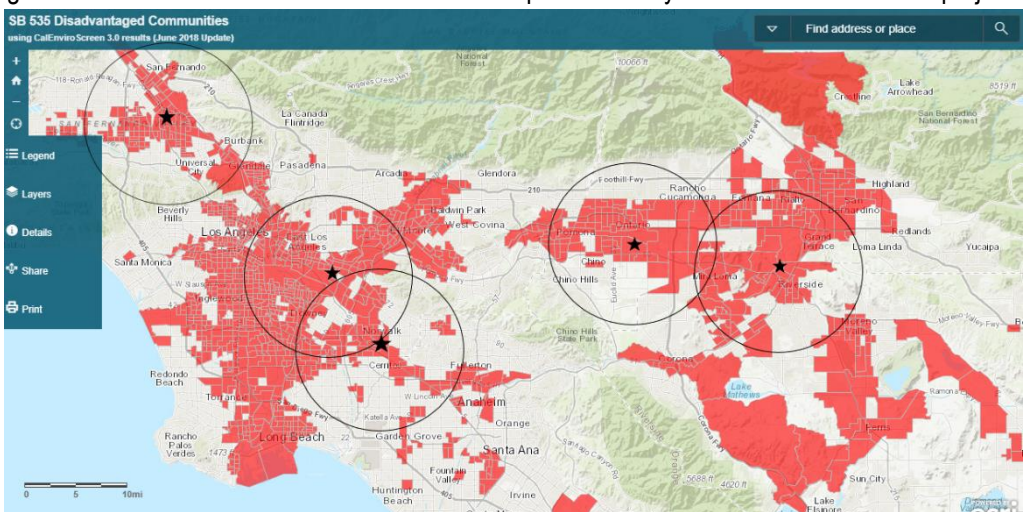

Figure 1 Fleet location overlays on SB 535 EJCs, from CalEPA's CalEnviroScreen 3.0.

(2-B) Community Engagement and Partnership: The EPA, CARB, the San Joaquin Valley Air Pollution Control District, and South Coast AQMD established the Clean Air Technology Initiative (CATI) Program to identify and implement projects that would significantly reduce emissions in communities like the cities of San Bernardino, Long Beach and Los Angeles. Since the creation of CATI Program in 2010, South Coast AQMD has organized several public workshops with public and private fleets, and community members such as Los Angeles Councilmember Jose Huizar's field deputy David Miranda, Monsignor John Moretta of the Resurrection Parish, and others to identify and develop community-specific solutions to air quality issues in areas disproportionately affected by air pollution. These workshops have produced eight air quality projects ranging from diesel truck replacements, railyard studies, air toxics studies, school bus replacement, locomotive replacements, as well as drayage truck replacements starting from 2010 to 2017. This newly proposed project is a product of these successful past development, demonstration and deployment projects. As follow-on to this project, South Coast AQMD will partner with U.S. EPA, CARB, CEC, and Ports of Los Angeles and Long Beach to further incentivize replacement of older and dirtier diesel delivery trucks with purposely built zero emission trucks like the ones in this study. There are also community

meetings and implementation activities from South Coast AQMD's implementation of the AB 617 program for the San Bernardino/Muscoy community, which also benefit the surrounding communities of Ontario, Chino, and Fontana in San Bernardino County. Many of the community meetings for the AB 617 program focus on communicating the benefits and challenges with implementing zero emission technologies in freight handling facilities in and around San Bernardino. This meeting raised awareness for South Coast AMQD's pathways to obtain needed emission reductions and public exposure in those communities. Based on these pervious experiences, South Coast AQMD and Xos Trucks together with participating fleets will utilize the exiting channels to further engage the communities especially EJCs, such as the Advanced Clean Transportation (ACT) Expo and public news releases.

Section 3 Project Sustainability: The responsibility of each project partner (South Coast AQMD, Xos Trucks, and fleet partners) to promote and continue efforts to achieve ongoing emission reductions of ozone and $PM_{2.5}$ after EPA funding for this project ended is discussed below.

South Coast AQMD: Because proposed project implements several control measures contained in the 2016 AQMP, South Coast AQMD anticipates applying any emission benefits from using electric in-lieu of diesel delivery trucks as credit toward an emission reduction commitment in the South Coast AQMD portion of the California State Implementation Plan. As such, as follow-on to this project, South Coast AQMD will collaborate with: 1) the CARB to maximize the impact of the existing Truck & Bus Regulation and upcoming Advanced Clean Trucks Regulation and to ensure older, dirtier diesel trucks gets turned over to the cleanest technology available; 2) state and local agencies to require zero emission technologies for short-haul commercial operations; and 3) federal and state agencies to provide incentive funds to cover the incremental cost of replacing diesel with zero emissions technologies.

Xos Trucks This project serves as a large point of validation for Xos Trucks platform as well as the medium-duty electric vehicle commercial vehicles. Fleets have been eagerly awaiting feedback from early demonstration partners to move forward with battery electric technology. A large deployment such as this study, like the 20 trucks from Loomis, is a strong indication of the feasibility of the battery electric technology. Xos is currently setting up U.S. co-manufacturing facilities to accommodate the growth expected. Xos plans to use data and feedback from this project to further optimize their design and technology. There will be twelve-months of data logging and EVSE support included as in-kind support.

Fleet Partners: This project affords the opportunity to expand on initial demonstration with Loomis and seed new deployments within the UniFirst and Choice Lunch fleets. The scale of this project extends far beyond the few vehicles being replaced. Choice Lunch has already made a commitment to purchase an additional 15 vehicles should the vehicles work as anticipated and UniFirst has indicated that electric would make a good case for a large portion of their fleet of more than 2,000 vehicles.

(4) Environmental Results – Outputs, Outcomes and Performance Measures

(4-A) Expected Project Output and Outcomes: Proposed project is to replace and deploy battery electric delivery trucks. These electric trucks will be used in lieu of pre-2010 model year diesel trucks (5 trucks) for fleets with replacement trucks or post-2010 model year diesel trucks in case of deployment (55 trucks). The projects are located and operated in, and the surrounding cities of Santa Fe Springs, North Hollywood, Anaheim, El Monte, West Covina, La Habra, Azusa, Montebello, La Puente, Buena Park, Cypress, Anaheim, Van Nuys, Sylmar, Santa Clarita, Northridge and Reseda. With the introduction of electric delivery trucks in the SCAB by 2021, the total emission benefits from using electric in-lieu of diesel trucks over 10-year project life is estimated to be more than 16 tons of NOx and 1.2 million gallons of diesel fuel displaced. The proposed project will lead to immediate and on-going improvements in regional air quality and human health, as well as other societal and economic benefits, particularly in locations where the residents are disproportionately impacted by diesel truck emissions along the numerous traffic corridors. Anticipated project outputs and outcomes are summarized in Table below. More details of the emissions reduction calculation and assumptions can be found in the Emission Reduction attachment. South Coast AQMD fully anticipates additional replacement vehicles once the project is awarded, as many of the patriating fleets indicated the need to turn over older fleets to comply with the CARB Truck and Bus Regulation.

Table 1 Anticipated Outputs and Outcomes for Short Term (1st year) and Long Term (over 10 years)

Outputs	Outcomes						
Emissions/Diesel Fuel Reductions (tons/gallons)		**NOx**	**PM 2.5**	**HC**	**CO**	**CO2**	**Diesel Fuel**
Replace 5 MY2007-2009 Class 3-6 diesel trucks with 5 battery electric Class 6 trucks	Short term (1st year)	0.399	0.003	0.025	0.091	122	10,875
	Long term (over 10 years)	1.879	0.026	0.159	0.585	1,223	108,750
Deploy 55 battery electric Class 6 trucks	Short term (1st year)	1.491	0.030	0.151	0.550	1,237	109,925
	Long term (over 10 years)	14.914	0.298	1.514	5.496	12,366	1,099,250
Totals (60 trucks)	Short term (1st year)	1.890	0.033	0.176	0.640	1,359	120,800
	Long term (over 10 years)	16.793	0.324	1.673	6.081	13,590	1,208,000

In additional to the air quality benefits, the deployment of electric delivery trucks over other technology will have the following outputs and outcomes including:

- **Fleet Operators Education and Acceptance**: The short haul fleet operators, including package delivery, linen delivery, cash transit, food delivery and residential & commercial restoration are predictable over fixed routes, with limited daily mileage and therefore minimizing range anxiety. Delivery trucks operate in highly congested environments and idling frequently, leading to high fuel usage, idling time and emissions. With completely removing the emissions from the operations and by using no fuel, fleet operators can significantly improve the energy efficiency of their operations and reduce operational costs. Hence, it's the perfect platform to educate end-users of this technology.
- **Commercialization Benefits**: The electrification of purposely built delivery trucks will serve as a catalyst to more adoption of zero emission electric drivetrain technologies amongst medium and heavy-duty fleets. There are many other medium duty electric trucks offerings but most existing trucks have relied on integrating passenger EV battery packs on commercial glider chassis. Conversion vehicles are insufficient for the safety and longevity demanded of vehicles in the commercial transportation space. This work will serve as a demonstration and show case of the capabilities and readiness of a purposely built electric trucks as a commercially viable and economically beneficial alternative to conventional powered trucks. In the medium to long term, the successful deployment of electric delivery trucks through this project will also serve as a model for other larger short-haul fleets in the United States to adopt EV's sooner to allow lower exposure for DACs typically located in urban areas of the SCAB. Xos expects the secondary effects of this project and both BLE and Loomis's commitment to clean transportation to result in an additional 300 orders by the end of the year.
- **Job Creation & Advancement of Zero Emission Technologies**: The large scale adoption of electric delivery trucks through this project will support the further development of zero emission technologies through regular monitoring, feedback and operational data collection which will be crucial for continuous technology improvements and to developing the next generation electric drivetrains. The opportunity to deploy 60 electric trucks will also require increased production of the Xos Battery, leading to direct job creation at the battery manufacturing facility in Los Angeles, CA (up to 5) and indirect job creation amongst the various Tier-One component suppliers as well as the co-manufacturing partners (up to 10) operating across America.

(4-B) Performance Measures: Measurable annual and life-time results of this project are described in the Expected Outputs and Outcomes section above. The predicted results will be tracked against the actual results by lead project partner Xos Trucks for a period of at least 12 months as in-kind support this project. South Coast AQMD will provide the EPA with quarterly progress reports and a final report, with input from project partners, on project milestones such as number of trucks deployed, any challenges and delays encountered, updated timeline, funds expended, and other pertinent information based on the project timeline. Performance measures for the zero-emission battery electric trucks include:

- **Deploy 60 Class 6 battery electric delivery trucks.** Xos Trucks will lead this task to track expenditures, project timeline, secure supply chain, execute necessary subcontracts, oversee EVSE installation and obtain necessary approvals/certifications/registrations with state and federal agencies.
- **Identify and address air quality issues.** Xos Trucks and South Coast AQMD will both lead this effort. By leveraging existing relationships with local municipalities and a variety of other stakeholders and existing efforts such as MATES V, AB 617, and data collection efforts, project partners will document how air quality issues are being addressed in part by reporting on zero emission mileage being gained with the project compared to prior diesel emissions.
- **Engage with affected communities**. Xos Trucks and South Coast AQMD will leverage existing relationships and efforts such as outreach activities, as well as AB 617 implementation in the Year 1 San Bernardino/Muscoy community. Performance will be tracked based on the number of organizations engaged, number of community meetings partners participate in, number of press releases; and number of questions/comments/concerns received.
- **Technology Improvement**. Xos Trucks will actively be working with fleet to collect usage information related to the newly developed battery electric truck, this including vehicle efficiency, miles traveled, charging efficiency, battery performance monitoring as well as issues and problem track and resolutions. These real-world generated metrics the help both South Coast AQMD and Xos understand battery electric technology under a wide variety of applications.
- **Disseminate project**. Xos and South Coast AQMD will lead this task. Performance will be tracked based on number of organizations that receive outreach materials; number of social media and web posts and press releases; conference presentations.
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To track and measure the project progress, South Coast AQMD will, in addition to its administrative duties, inspect and record the serial numbers, VINs, horsepower, odometer readings, make, model, and year of the MDDTs, to be replaced and confirm through photographs of destroyed engine and trucks and a certificate signed and dated by an authorized scrap yard representatives that a 6-inch hole was cut into the engine block.

(4-C) Performance Plan: South Coast AQMD, as the project administrator, will monitor Xos Trucks and participating fleets on progress according to the project schedule and through project completion and close-out. South Coast AQMD has effectively and successfully managed several fleets and OEMs on similar projects. Experience includes relevant work deploying battery electric and fuel cell trucks in fleets and administering drayage truck deployment projects such as DOE's Zero Emission Cargo Transport (ZECT) 1 and ZECT 2, CARB's Greenhouse Gas Reduction Fund Zero Emission Drayage Truck (ZEDT) Program and Zero and Near-Zero Emission Freight Facilities Project, and the Daimler battery electric truck project funded by South Coast AQMD, the Ports of Los Angeles and Long Beach, and the EPA. The Output and Outcome Tracking and Measurement Plans in Table 6 and Table 7 below show South Coast AQMD's method to efficiently and effectively ensure desired results are achieved.

Table 2: Output and Outcome Tracking and Measurement Plan

Output	**Tracking Plan**	**Measuring Plan**
Replace diesel trucks with electric trucks	Request quarterly status updates from Xos Trucks and fleets	Compare actual progress to schedule to determine any deficiencies
Deploy electric trucks		
Outcome	**Tracking Plan**	**Measuring Plan**
Annual Emission Reductions	Data collector to install data loggers to track agreed upon performance metrics on fleet vehicles	Analyze data based upon approved data collection plan including emission reductions based on actual vehicle miles travelled by fleet vehicles
Lifetime Emission Reductions (10-year life)		
Diesel Fuel Conservation		

(4-D) Estimated Project Timeline: The detailed project plan is divided into five major tasks: administrative duties, technology design and optimization, Vehicle data collection and evaluation, technology demonstration, and monitoring and reporting. The timeline for completion of the project and technical milestones associated with the five tasks are outlined in Table below. All work will be completed by March 31, 2024. South Coast AQMD will monitor and collect operational and performance data from participating fleets for the project duration. This schedule is reasonably adequate to complete proposed project and achieve project goals and objectives. South Coast AQMD, Xos Trucks and fleet partners are ready to begin executing the project if proposed project is approved.

Table 3 Estimated Timeline for Project Milestone

Milestone	**Responsible Party**	**2020**				**2021**				**2022**				**2023**	**2024**
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1-Q4	Q1
Task 1: Grant Agreement & Outreach															
1.1 Seek Board Approval to recognize grant & award contract	SCAQMD														
1.2 Execute a grant agreement with EPA	SCAQMD														
1.3 Execute contract with sub-awardees	ALL														
Task 2: Technology Design, Build, and Optimization															
2.1 Design specification and parts procurement	Xos														
2.2 Build Vehicles	Xos														
2.3 Pre-Delivery vehicle testing	Xos														
2.4 Optimize and fine tune machines	Xos														
2.5 Train Fleet and Prepare Support for Vehicles	Xos & Fleets														
Task 3: Vehicle Charger Deployment															
3.1 Design Site Plan	Xos & Fleets														
3.2 Purchase Equipment	Fleets														
3.3 Engineering Assessment	Xos														
3.4 Installation	Xos & Fleets														
Task 4: Technology Demonstration															
4.1 Demonstration planning	Xos & Fleets														
4.2 Electric Vehicle Deployment	Xos														
4.3 Interim Demonstration Data Collection	Xos & Fleets														
4.3 Final Demonstration Data Collection	Xos & Fleets														
Task 5: Monitoring and Reporting															
5.1 Quarterly Reports	ALL														
5.2 Air Quality Benefit Analysis	SCAQMD														
5.3 Final Report	SCAQMD														

(5) Programmatic Capability and Past Performance

(5-A&B) Past Performances and Reporting Requirements: South Coast AQMD has participated with EPA on several EPA-funded assistance agreements within the last three years. Table 4 lists three of these agreements, and provides the progress, status, and South Coast history of meeting the reporting requirements under the agreements.

Table 4 EPA-Funded Assistance Agreements

EPA Agreement (Agreement Number)	Description	Status of Deliverables	Reporting
Diesel Emission Reduction Projects (EM-00T34701-0)	The agreement ($5 million) is to (1) install a shore power infrastructure, (2) replace 25 HDDTs with 2010 compliant HDDTs, (3) replace and demonstrate up to 28 UPS diesel delivery trucks with zero-emission vehicles, and (4) replace 19 older diesel school buses with 2014 or newer natural gas school buses certified to meet 0.2 g/bhp-hr NOx and 0.01 g/bhp-hr diesel PM	Completed	The program has been completed and a final technical report was submitted to EPA in 2017
Shuttle Bus Replacement (EM-99T71501)	The agreement ($3.2 million) is to replace conventional diesel and gasoline powered shuttle buses with zero emission shuttle buses in Southern California airports	On-going	Progress reports submitted on a quarterly basis
Daimler Develop Heavy-Duty Trucks with EV Infrastructure (A00909418)	The agreement ($500,000) is to develop 20 heavy-duty battery electric trucks with EV infrastructure and energy storage to demonstrate in real-world commercial fleet operations in DACs	On-going	Progress reports submitted on a quarterly basis

For over 20 years, South Cost AQMD has encouraged, fostered and supported clean fuels and transportation technologies, such as hydrogen and fuel cells, natural gas engines and infrastructure, battery electric vehicles, plug-in hybrid electric vehicles and related fueling infrastructure. In 2019 alone, South Coast AQMD's Clean Fuels Program executed 76 new and continuing contracts, projects, and studies in collaboration with a wide cross-section of industry partners. In addition to research and development activities, South Coast AQMD has a long history of successfully collaborating with stakeholders to reduce emissions from heavy-duty diesel trucks. South Coast AQMD is successfully implementing several air quality incentive programs, including the Lower Emission School Bus Program, the Carl Moyer Memorial Air Quality Standards Attainment Program (with a separate Fleet Modernization element), the SOON program, and California's Goods Movement Emissions Reduction Program (Proposition 1B). To date under the School Bus Program, South Cost AQMD has awarded nearly $240 million and replaced nearly 1,450 pre-1994 school buses with new natural gas buses, and retrofit nearly 3,000 school buses with Level 3 PM trap filters, filters that reduce over 85 percent of harmful diesel exhaust emissions. Through the Carl Moyer Program, South Coast AQMD over the last decade has successfully deployed more than 4,000 vehicles and equipment pieces through the allocation of $120 million in state funds. Under the Proposition 1B program, South Coast AQMD spearheaded the deployment of 132 LNG-fueled trucks within the fleet of Cal Cartage Company by successfully leveraging federal funds for cost sharing. South Coast AQMD provided matching funds of $11.88 million ($90,000 per truck) for that project. Over the last decade South Cost AQMD has thoroughly demonstrated its capabilities and expertise to successfully plan, implement, and administer EPA sponsored diesel emissions reduction programs totaling over $50 million.

(5-C) Staff Experience, Qualification, Knowledge, and Resources: Resumes for key personnel are included as an attachment with the application. South Coast AQMD's staff has more combined experience managing and administering grants for clean transportation projects than most public agencies in the U.S. South Coast AQMD's portfolio of expertise includes managing EPA grants, preparing and managing awards with commercial fleets, monitoring work progress, and showcasing successful projects. This project will be implemented by a Planning & Rules Manager, Financial Analyst, Air Quality Specialist, Contract Assistant, and Deputy District Counsel. Overseeing the South Coast AQMD team is Dr. Matt Miyasato and Naveen Berry, Deputy and Assistant Deputy Executive Officers, respectively for Science & Technology Advancement, including the Technology Advancement Office. Dr. Miyasato and Mr. Berry's principal charges are to identify, evaluate and stimulate development and commercialization of clean air technologies, develop, and coordinate mobile source regulations, and to conduct ambient monitoring, source testing and laboratory analysis. Dr. Miyasato received his undergraduate degree in Mechanical Engineering, and his master's and Ph.D. in Engineering, specializing in combustion technologies and air pollution control – all from the University of California, Irvine. Mr. Berry hold a Bachelor of Science and a Master's degrees from U.C., Riverside and UCLA, with thirty years of experience in stationary and mobile sources. Dr. Sam Cao is the Air Quality Specialist who will manage the proposed project. He has over 10 years of industry and academia experience in air pollution and emissions measurement and has managed several RDD&D projects from natural gas to battery electric, advanced technologies for off-road and on-road transportation sources, incentive programs, clean alternative fuel technologies, and retrofit programs. He has a B.S. degree in chemical engineering from University of California, San Diego and a Ph.D. in chemical and environmental engineering from University of California, Riverside. Joseph Impullitti is the Technology Demonstration Manager whose duties will include managing the project. He has over 24 years of electric vehicle, hybrid vehicle and fuel cell powered vehicle design and development experience. Nancy Cole is the financial analyst whose duties include managing the fiscal and administrative aspect of the proposed project. She has over 10 years of experience managing administrative and financial aspects of federal and states grants including managing the financial aspects of the 2010, 2016 and 2017 EPA Targeted Air Shed Grant awards. The Contract Assistant will assist the Air Quality Specialist in managing the contract with Xos Trucks and will be selected from a team of Contract Assistants who have managed administrative aspects of RDD&D and incentive programs. The Program Supervisor will work with the Air Quality Specialist to closely management the project. The Deputy District Counsel will provide legal guidance to the staff throughout the planning and implementation phase of the proposed project.

(6) Leveraged Funding: The South Coast AQMD is leveraging contributions from project partners to provide a substantial voluntary cost share for the proposed project. South Coast AQMD requests $8,144,064 from the EPA Air Shed Grant Program to fund the proposed project, which is estimated to cost $14,562,802. The remaining $6,418,738 will be cost share by various sources, as shown in Table 7. Funding from CARB's HVIP program $720,000 will be applied towards cost of 8 trucks with Choice Lunch and ATI (secured vouchers attached to letters of commitment). Funding from fleets will go towards partial cost of trucks ($2,568,016), taxes and fees ($1,056,322), as well specialty armored body cost ($1,400,000 – Loomis only). Xos Trucks will provide in-kind support via vehicle service/repair, vehicle and charger support, project management as well as 12-month vehicle data logging estimated to be $674,400.

Table 5: Project Partners and Contributions

Funding Source	Amount
EPA Air Shed Grant	$8,144,064
In-kind from Xos	$674,400
HVIP	$720,000
Fleets Cost-Share	$5,024,338
Total	$14,562,802

(7) Detailed Budget Narrative

(7-A) Procedures for Efficient Expenditures: The South Coast AQMD staff has extensive experience managing engine and vehicle technology development and demonstration projects. Our highly technical staff has the resources and expertise necessary to successfully implement the proposed project, including drafting a contract with appropriate terms and conditions, detailed task descriptions, and payment schedules tied to milestones to ensure all required tasks have been satisfied before any funds are paid out. In addition, South Coast AQMD will closely monitor the progress of the project via telephone calls, e-mails, meetings and site visits as well as quarterly progress reports provided by the contractors. Invoices are generally processed and paid out within 30 days of the receipt by the South Coast AQMD to ensure projects are not negatively affected by delayed reimbursements.

(7-B&C) Reasonableness of Budget and Budget Detail: *T*he total project cost is estimated to be $14,562,802, of which South Coast AQMD is requesting $8,144,064 from EPA, including administrative costs of $407,080 necessary for South Coast AQMD to implement the project. The requested funds will be used to supplement the costs of 60 electric delivery trucks ($7,256,984) and EVSE ($480,000). Only approximately 5 percent or $407,080 of the requested fund will be allocated for administrative costs and the remaining grant of $7,736,984, along with $6,418,738 of cost share from the non-federal sources, will be allocated for the cost of vehicle and project support and reporting cost. The budget summary is shown in below.

Table 6 Budget Summary

Line Item and Itemized Cost	EPA	Non-Federal Cost Share
Personnel		
(1) Planning & Rules Mgr (Annual Salary-$73/hr; 95 Hours)	$6,909	
(1) Program Supervisor (Annual Salary-$63/hr; 877 Hours)	$55,273	
(1) AQ Specialist (Annual Salary-$52/hr; 1,329 Hours)	$69,092	
(1) Contract Assistant (Annual Salary-$28/hr; 247 Hours)	$6,909	
Total Personnel	$138,183	
Fringe Benefits – 57.48% of Salaries. Includes Retirement, Health Benefits, FICA & SUI	$79,428	
Contractual - Xos Trucks (60 Electric Trucks)	$7,736,984	$6,418,738
Indirect Charges (84.77% applied to Salaries & Employee Benefits)	$184,469	
Travel (site visit, conference presentations)	$5,000	
Total Project Cost	$14,562,802	

As shown in Table 6 above, project partners will provide $6,418,738 in voluntary cost share for the proposed project as outlined in the commitment letters attached. The CARB's HVIP vouchers has been secured and details attached to respective commitment letters. To ensure that the sub-awardee provides the committed mandatory cost share, South Coast AQMD will only reimburse sub-awardee upon receipt of valid invoice that includes the total expenditure with proper documentation as each task is completed and required report is submitted. This budget is sufficient to accomplish the proposed goals, objectives, and measurable environmental outcomes.

8) Attachments

- **a)** Emissions Inventories Analysis
- **b)** Emission Reduction Calculation Descriptions
- **c)** Leverage Funds Cost-Share Commitment Letters
- **d)** Resumes